

**LODGING INDUSTRY
ENERGY EFFICIENCY
PROGRAM**

**Local Energy Efficiency
Program Proposal**

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1. PROGRAM OVERVIEW

ADM Associates, Inc. (ADM) is proposing a Lodging Industry Energy Efficiency Program, which is a program to increase awareness among owners/operators of small lodging facilities about technologies, measures, and operational and maintenance practices that they can undertake to improve energy efficiency in their facilities. Our proposed program is patterned on the Lodging Industry Education Program that we have successfully conducted for Southern California Gas Company (SoCalGas) over the last two years. Through this program for SoCalGas, we have provided guidance on energy efficiency improvements to over 1,200 owners/operators of small hotels and motels.

1.1 BRIEF DESCRIPTION OF PROGRAM

The Lodging Industry Energy Efficiency Program that we are here proposing is modeled on the Lodging Industry Energy Education Program that we have conducted for SoCalGas over the last two years. We are proposing the Lodging Industry Energy Efficiency Program to extend the successful program that we have implemented for SoCalGas to the service territory of PG&E, particularly those areas that receive electric and gas, or electric-only service from PG&E. (That is, municipal electric service areas within PG&E's service territory are excluded.) The funding for the program is from both electric public goods charges and gas surcharges.

Building on our work for SoCalGas, we provide a cost-effective method to get the owners/operators of small hotels/motels to undertake energy efficiency efforts through a hands-on marketing approach. Rather than relying on a one-to-many (teacher-to-student) type of educational approach, we use a more directed one-to-one approach in which we make on-site visits to small hotels and motels to inform their owners/operators about energy efficiency and to identify measures that they can implement in their facilities. Through the proposed Lodging Industry Energy Efficiency Program, we provide owners and operators of independent lodging facilities with the tools necessary to make informed purchases of energy consumption equipment and to put practices and procedures in place that can result in substantial energy savings. As discussed below, we also provide rebates for small hotels/motels installing low-flow showerheads.

Based on our work for SoCalGas, we have identified the major energy and cost saving measures for small hotels/motels to be compact fluorescent lighting and low-flow showerheads. Rebates for installing compact fluorescent lighting are available to small hotels/motels through the Statewide Nonresidential Express Efficiency Program. However, there are no rebates currently offered for installing low-flow showerheads. Therefore, we are proposing to include a rebate

component in the Lodging Industry Energy Efficiency Program whereby we offer rebates on low-flow showerheads to small hotels/motels.

Based on data that we have collected during our work on the Lodging Industry Energy Education Program for SoCalGas, the average flow rate for showerheads in small hotels/motels is about 2.7 gallons per minute. (This value is calculated from measured data that we have collected at nearly 1,200 small hotels/motels during the SoCalGas program.) Significant energy savings can be achieved by installing showerheads with a flow rate of 1.6 gallons per minute. Moreover, considerable reductions in water use and sewer charges also result from using low-flow showerheads. In our work for SoCalGas, many owners/operators of small hotels/motels have inquired about the availability of rebates to assist them in installing low-flow showerheads.

The retail cost of a low-flow showerhead with a flow rate of 1.6 gallons per minute is about \$15. As the rebate component of the Lodging Industry Energy Efficiency Program, we propose to pay a rebate of \$7.50 for any showerhead that a small hotel/motel installs that has a flow rate of 1.6 gallons per minute or less. We have budgeted to allow rebates for the installation of 20,000 low-flow showerheads.

1.2 PROGRAM RATIONALE

Many small hotels and motels are owned and operated by individuals (e.g., first-generation immigrants for whom English is not the first language) whose primary interest and concentration are on maintaining a profitable operation. With their primary focus on running their business, owners and operators of small hotels and motels generally do not have the time available to attend seminars or to read and digest materials mailed to them. Because of this, owners/operators of small hotels and motels are a hard-to-reach market. Moreover, small hotels and motels often use technologies that are less energy efficient, providing considerable opportunity for improving the energy efficiency of their operations. For example, (as shown below in Section 4), small hotels and motels use a disproportionate share of incandescent lighting and are therefore good candidates for changing to compact fluorescent lighting.

The lack of information about the benefits of energy efficiency is a major barrier to improving the energy efficiency in small hotels and motels. Nevertheless, most owners of small hotels and motels are business-savvy and responsive to ways to reduce their costs or improve the quality of service they offer their customers. Thus, a more targeted and direct approach to disseminating information on the benefits of energy efficiency is needed to be effective in reaching decision-makers for small hotels and motels.

1.3 PROGRAM OBJECTIVES

We are proposing to conduct visits to 1,100 small hotels/motels during PY 2002 and PY 2003. Table 1-1 provides summary information regarding the objectives for our proposed Lodging Industry Energy Efficiency Program.

Table 1-1. Proposal Summary for Lodging Industry Energy Efficiency Program

Program Name	Lodging Industry Energy Efficiency Program
Program Category	Local Nonresidential
Budget	\$643,500
TRC Ratio	1.96
PPT Ratio	2.33
Annual kWh Savings Target	6,834,256 kWh
Annual Peak kW Reduction Target	3,206.4 kW
Annual Therm Savings Target	434,000 therms
Other Performance Targets	Visits to 1,100 lodging establishments; Rebates for 20,000 low-flow showerheads
Program Strategies	Energy audits recommending energy efficiency measure implementation; Rebates for low-flow showerheads
Target Market Segments	Small Nonresidential

As shown by the summary data in Table 1-1 and by the rest of our proposal, the Lodging Industry Energy Efficiency Program that we are proposing satisfies various criteria that the CPUC has specified for local efficiency programs.

- It will provide long-term annual energy (electric and gas) savings by identifying measures that owners/operators of small hotels and motels can implement to improve the energy efficiency of their operations and by following up with the owners/operators to encourage them to make the improvements. It also provides electric peak demand savings.
- The program is cost effective in the savings it provides per dollar of cost. The TRC is 1.96, and the PPT is 2.33. (These tests are documented in Section 4 and in the accompany spreadsheet.)
- It addresses a major market barrier for improving energy efficiency in small hotels and motels (i.e., the lack of information among owners/operators of these facilities) by using a direct marketing approach with site visits.
- The proposed program has strong equity considerations in that it is targeted toward a segment of the market that has traditionally been hard to reach with other programs.
- The program is innovative in using a one-to-one marketing approach to deliver energy efficiency information that is specific to small hotels and motels.

- The program has synergies with programs run by utilities and other entities in that it provides a vehicle for directing owners/operators of small hotels and motels to programs that can provide them further assistance or financial incentives (e.g., Express Efficiency).

2. PROGRAM PROCESS

Our process for the proposed Lodging Industry Energy Efficiency Program builds directly on the process and procedures that we have been using over the past two years in implementing a similar program for small lodging facilities in the service territory of Southern California Gas Company. We already have in place all of the procedures needed to operate this Lodging Industry Energy Efficiency Program.

Market research and our experience in implementing the Lodging Industry Energy Education Program for Southern California Gas has shown that the most effective way of delivering information on energy efficiency to owners/operators of lodging facilities is through face-to-face interactions at individual facilities. As discussed in Section 3, owners/operators of small hotels/motels represent a “hard-to-reach” market. Research into the lodging market to identify the common practices of independent lodging owners has shown that owners/operators of small hotels/motels are usually busy with the day-to-day operation of their facilities and do not feel they can afford the time to attend workshops and seminars or to read and digest materials mailed to them.

Accordingly, we use the Lodging Industry Energy Efficiency Program to disseminate information on energy efficiency to owners and/or operators of small hotels/motels through free on-site energy consultations (as well as through newsletters and a website). We visit individual establishments and instruct each owner/manager on energy efficiency one-on-one. There is considerable evidence that not only does a manager have to be met one-on-one, but he/she has to be interacted with multiple times. The thrust of our approach is make these interactions as cost-effectively as possible.

Owners and/or operators of lodging facilities who qualify for the program are targeted using a statewide list of hotels and motels that we compile from industry and utility sources. The target audience is defined to be independently owned and operated lodging facilities. The list is examined to identify large hotels (having over 150 rooms) and national motel/hotel chains, which are then removed from the list. The remaining hotels/motels are targeted for the on-site consultations, rebates for low-flow showerheads, and newsletter mailings.

The first contact we make with the owner/manager of a small hotel or motel is a telephone contact. The majority of on-site consultations are performed from set appointments. ADM schedulers call a facility and spoke to the owner or operator to set an appointment at a time convenient for the decision-maker. If a scheduled appointment cancels or for some other reason can not be performed, the field engineers attempt an unscheduled “drop-in”. In implementing the program for

SoCalGas, approximately 1 percent of the consultations we performed were as drop-ins.

The second contact we make is a field visit to deliver energy efficiency information directly to an owner or operator. We also use a site visit to inform and educate an owner/manager regarding the advantages of installing energy efficient equipment. We use multilingual (e.g., Spanish, Chinese, Indonesian, Malaysian, Urdu, Tamil, Vietnamese, Farsi, Arabic) engineers to conduct the field visits. The field engineers are equipped with the tools needed to provide the services (e.g., ladders, filters, laptop computers and printer, etc.).

Upon arriving at a small hotel/motel for an on-site energy consultation, our field person introduces himself as being from ADM Associates, Inc. We give a copy of a Smart Lodging manual to the owner/operator and review its contents with him/her. (The introduction to this manual is included as an attachment in Section 10.) The manual includes the following:

- Introduction;
- Graphical representations of typical energy use for a motel;
- Energy conservation strategies, including useful energy reducing and maintenance tips;
- Step-by-step strategy development;
- Identification of equipment for which improvements in energy efficiency appeared feasible;
- Energy savings and payback period worksheets for specific energy efficiency improvements; and
- Financial assistance information including available rebates, rebate applications for the statewide Express Efficiency Small Business rebate program, low interest financing and equipment leasing options.

Each consultation includes a walk-through inspection of the lodging facility, allowing the field person to record specific information about energy-using aspects of the guestrooms (e.g., lighting, showerhead flow rates, space conditioning) and particular areas where gains in energy efficiency can be made in hotels and motels. As a means of demonstrating areas where energy may be used inefficiently in a hotel/motel, we begin the walk-through by working with the owner/operator to measure the flow rate of showers in typical guest rooms. We use this measurement as an opportunity to illustrate the amount of energy that can be saved by using low-flow showerheads. We also indicate that under the rebate component of the Lodging Industry Energy Efficiency Program, they can receive a

rebate of \$7.50 for each showerhead that they install that has a flow rate of 1.6 gallons per minute or less.

After we make the showerhead demonstration, we proceed to address other technologies in the walk-through inspection. These include:

- Energy efficient lighting
- Energy efficient space heating
- Energy efficient water heating
- Energy efficient cooking
- Low-flow shower heads and flow restrictors
- Room energy management systems
- Energy efficient clothes washers
- Window shading

Each field person is equipped with a laptop computer that he/she uses to analyze the economics of energy efficiency for these different end uses that are specific to that specific hotel or motel and to demonstrate to the owners/operators what the savings for their facility would be. The computer program used for the analysis of energy and cost savings associated with the energy efficiency measures has been developed specifically to be used for small lodging facilities. The program uses algorithms that we have developed using extensive data on the physical and thermal characteristics of small hotels and motels, the results of extensive building energy simulations with DOE 2, and published monitored end-use data. HVAC savings are computed that are specific to each of the 16 climate zones defined by the CEC for California. The costing of the measures is accomplished with data from the DEER data base.

Recommendations regarding energy efficiency improvements are made based on the existing equipment observed, and computer-generated worksheets are completed for the recommended improvements, estimating the potential energy savings and payback periods. Available financial assistance programs are discussed (including information about rebates available from other statewide programs), and rebate forms are reviewed to show the owner/operator what payment options are available if he installs energy efficiency improvements.

One area of energy use that can be emphasized for small hotels/motels is energy efficient lighting. Hotels and motels account for a significant portion of the connected incandescent lighting load in the commercial sector. For example, PG&E's 1999 Commercial Building Survey Report shows that lodging facilities

account for over 20 percent of the connected load for incandescent lighting. Moreover, data that we have collected during our performing of the Lodging Industry Energy Education Program for SoCalGas shows that only about 21 percent of small hotels and motels are using any compact fluorescent lighting.

However, many of the owners and/or operators of small hotels and motels are not well informed on the benefits that energy efficient lighting might provide them. Moreover, because of the fragmented and diverse nature of the small hotel/motel market, suppliers of energy efficient lighting must incur high marketing costs. We use the Lodging Industry Energy Efficiency Program to open up the market for energy efficient lighting in small hotels and motels by providing on-site demonstrations of the efficacy of energy efficient lighting to small hotels and motels that we visit.

Based on our work for SoCalGas, we expect that other types of recommendations for saving energy can also be made for significant numbers of the facilities that we will visit. For example, the hotels/motels that we visited for SoCalGas typically were most interested in compact fluorescent lighting and low flow showerheads, due to the high rebates on lighting and rapid payback periods on both. Other types of recommendations may include the following:

- Changes to indoor lighting may include to change incandescent lighting to compact fluorescent lighting.
- Changes to outdoor lighting may include to change incandescent lighting to compact fluorescent lighting.
- Changes in the flow rate for showerheads may be recommended. For our work for SoCalGas, our recommended changes would result in the flow rate across facilities being reduced from 2.7 gallons per minute to 1.6 gallons per minute.
- Changes in the efficiency of water heaters may be recommended. For example, a facility with a water heater rated at 75,000 Btuh or less would be recommended to install a water heater with an energy factor of 0.63 or higher. A facility with a water heater rated at more than 75,000 Btuh would be recommended to install a water heater with a thermal efficiency of 80 percent or higher or a condensing unit with an efficiency of over 90 percent.
- Changes to improve the efficiency of boilers used for water heating and/or space heating that are recommended are to install boilers with thermal efficiencies of 82 percent or higher or tankless boilers with efficiencies exceeding 90 percent.

- Changes to improve the efficiency of air conditioning units may be recommended, depending on the sizes and efficiencies of the air conditioners currently used.
- Installing solar reflecting film on windows may be recommended.
- Installing an energy management system (EMS) may be recommended.

We make a follow-up call to each owner/operator at 4 weeks after the site visit. Through this call, we determine whether they have proceeded to implement any of the recommendations for energy efficiency improvements. We also ask if we can provide any assistance in identifying potential vendors to perform the improvements or any additional information they might need to proceed with the implementation.

As appropriate, we pass information from our marketing efforts to trade allies to equip them to “close the deal” on selling energy efficient equipment to an interested hotel/motel.

Concurrent with the on-site consultations, we produce and distribute newsletters that contain information for small hotels/motels on many aspects of operating and maintaining a lodging facility, with specific details given on possible energy efficiency improvements and utility rebates. The newsletters also contain information on other topics of interest to hotel/motel operation, such as boiler emission regulations, new technologies, useful operation and maintenance tips and available financing. The newsletters are also used to advertise other rebate and incentive programs. Examples of the newsletters that we have prepared for the Lodging Industry Energy Education Program that we conducted for SoCalGas are included as attachments to this proposal (see Section 10).

In our work for SoCalGas, we established an information website for owners/operators of small hotels/motels (www.socalodging.com). For the statewide program we are here proposing, we develop a similar website (with domain name www.calodging.net) to provide another source that owners and/or operators of lodging facilities can consult for information about making profitable energy-using equipment purchases and about putting in place practices and procedures that can result in substantial energy and cost savings. The newsletters are also posted on this website.

3. CUSTOMER ELIGIBILITY

The Lodging Industry Energy Efficiency Program is targeted at owners/operators of small hotels/motels in the areas shown in Figure 3-1. The targeted areas generally represent the electric service portion of PG&E's service territory (i.e., municipal electric service territories are excluded). PG&E's *Commercial Building Survey Report: 1999* indicates that there are about 3,500 lodging facilities in PG&E's electric/gas or electric-only service areas, with 88 percent of these facilities having less than 50,000 square feet.

Small hotels/motels are a "hard-to-reach" market for energy efficiency services because of several characteristics.

- Until recently the costs of energy have not been large enough to be noticed by owners/operators of small hotels and motels.
- Many owners/operators of small hotels and motels are not aware of what energy efficiency improvements can be done for their facilities and what these improvements can do for them.
- Owners of small hotels and motels are often recent immigrants, whose primary language is not English. Thus, information disseminated through mass media channels are not likely to have much influence on them.
- The primary interest and concentration of these business owners is on maintaining a profitable operation. With their primary focus on running their business, these owners generally do not have the time available to attend seminars or to read and digest materials mailed to them.

Nevertheless, most owners/operators of small businesses are business-savvy and responsive to ways to reduce their costs or improve the quality of service they offer their customers. For these reasons, a targeted and direct approach to marketing energy efficiency can be effective in encouraging owners/operators of small hotels and motels to improve the energy efficiency of their operations.

Based on our work with SoCalGas, most of the targeted hotels and motels will have individual owners. For nearly three-fourths of the lodging facilities we have visited for SoCalGas during the Lodging Industry Energy Education Program, the facility visited was the only one owned by the particular owner/operator.

For all of the targeted hotels and motels, lighting and HVAC (both for space cooling and for space heating) are targeted for recommendations for energy efficiency improvements.

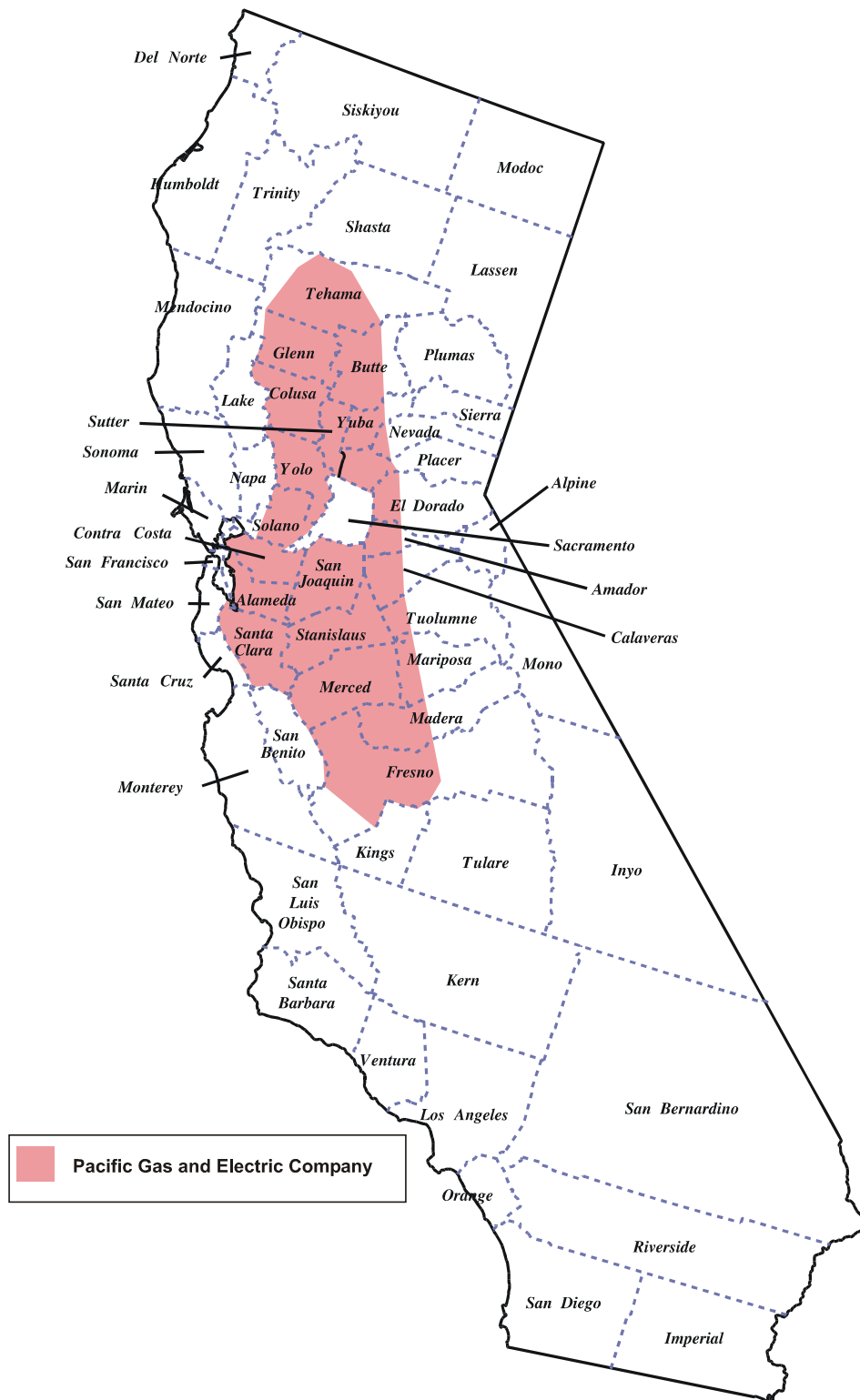


Figure 3-1. Areas Targeted for Lodging Industry Energy Efficiency Program

4. COST-EFFECTIVENESS CALCULATIONS

The proposed Lodging Industry Energy Efficiency Program is primarily an information program. However, savings will be achieved to the extent that lodging facilities implement the energy efficiency recommendations that are recommended to them.

We have used the cost-effectiveness spreadsheet provided by the CPUC to calculate the cost-effectiveness of the Lodging Industry Energy Efficiency Program. The summary results from these calculations are reported in Table 4-1.

*Table 4-1. Summary Results of Cost-Effectiveness Calculations
for Lodging Industry Energy Efficiency Program*

<i>Test</i>	<i>Costs</i>	<i>Benefits</i>	<i>Ratio</i>	<i>Net Benefits</i>
TRC test	\$1,749,903	\$3,429,330	1.96	\$1,679,427
Participant test	\$2,207,718	\$5,147,235	2.33	\$2,939,517

The cost-effectiveness calculations assume that visits are made to 1,100 small hotels/motels and that rebates are offered for the installation of 20,000 low-flow showerheads. The savings estimates used in the cost-effectiveness calculations are reported in Tables 4-2 and 4-3.

- The estimates in Table 4-2 represent energy savings potential when all the recommended measures are installed in a small lodging facility.
- The estimates in Table 4-3 represent expected energy savings estimates in a typical small lodging facility. The expected implementation rates for the lighting measures are based on the follow-up evaluations that we have conducted for the SCG Lodging Industry Education program. The water heating savings are based on verifiable rebates to be provided to the lodging facilities.
- The savings associated with the other measures are not claimed for determination of TRC and PPT. Our evaluation of our SCG Lodging Industry Education Program indicates that other measures, such as high-efficiency water heaters, have been implemented based on our recommendation. These additional savings will increase the TRC values.

Table 4-2. Potential Energy Savings in a Small Lodging Facility

<i>End Use</i>	<i>Measure</i>	<i>Savings kWh</i>	<i>Savings kW</i>	<i>Savings Therms</i>
Indoor Lighting	Replace incandescent lamps with compact fluorescent lamps	6,800	5.2	N/A
Outdoor Lighting	Replace incandescent lamps with compact fluorescent lamps	13,700	3.1	N/A
HVAC	Install high efficiency Air Conditioner/Heat Pump	12,000	12.0	N/A
HVAC	Install solar reflective window film	7,500	N/A	N/A
HVAC	Install energy smart thermostat	3,600	N/A	N/A
Water Heating	Install low flow shower heads	N/A	N/A	1300
Water Heating	Install high efficiency water heater	N/A	N/A	600
Swimming Pool	Install high efficiency pool heater	N/A	N/A	1,100
Swimming Pool	Install high efficiency pool pump	1,140	1.8	N/A

Table 4-3. Electric Energy Savings Per Small Lodging Facility, Used In TRC and PPT Tests

<i>End Use</i>	<i>Measure</i>	<i>Implement- ation Rate %</i>	<i>Expected Annual Savings</i>		<i>Life</i>	<i>Total Life Savings, kWh</i>	<i>Gross Incremental Measure Cost</i>
			<i>kW h</i>	<i>KW</i>			
Indoor Lighting	Replace incandescent lamps with compact fluorescent lamps	41.1%	2,793	2.14	8	22,348	\$1,276
Outdoor Lighting	Replace incandescent lamps with compact fluorescent lamps	25.0%	3,420	0.78	8	27,356	\$168
Total			6,213	2.9	8.0	49,704	\$1,444

Table 4-4. Gas Energy Savings Per Low-Flow Showerhead, Used In TRC and PPT Tests

<i>Measure</i>	<i>Savings / Unit Therms</i>	<i>Quantity</i>	<i>Life</i>	<i>Life Savings Per Unit Therms</i>	<i>Total Annual Savings Therms</i>	<i>Gross Incremental Measure Cost</i>
Install low flow shower heads	21.7	20,000	10	217	434,000	\$15

5. PROGRAM PERFORMANCE GOALS

The overall program performance goal for the Lodging Industry Energy Efficiency Program is to deliver energy efficiency consultation visits to 1,100 small hotels and motels and to provide rebates for the installation of 20,000 low-flow showerheads at these facilities. The Lodging Industry Energy Efficiency Program will be implemented in the service territory of PG&E. Table 5-1 shows the number of audits and rebates to be provided for each program year (i.e., PY 2002 and PY 2003).

Table 5-1. Number of Lodging Audits and Rebates Provided by Program Year with Expected Savings

<i>Program Year</i>	<i>Measure</i>	<i>Quantity</i>	<i>Savings</i>		
			<i>MWh</i>	<i>KW</i>	<i>Therms</i>
2002	Lodging Audits	400	2,485.2	1,166	
2002	Low Flow Shower Head Rebates	6,000			130,200
2003	Lodging Audits	700	4,349.1	2,040	
2003	Low Flow Shower Head Rebates	14,000			303,800
Totals			6,834.3	3,206	434,000

We use the visits to provide the owners/operators of small hotels and motels with recommendations for energy efficiency improvements that they can make to lower their electricity and gas usage and costs. We also use the visits to improve the understanding of energy use among the owners/operators of small hotels and motels.

The data presented in Section 4 show that significant savings can be achieved if small hotels and motels implement some relatively straightforward energy efficiency improvements. Accordingly, a related goal of the program is to work with owners/operators of the small hotels and motels that we visit to help them actually implement the recommendations. As noted, we have included a rebate component in the program to encourage owners/operators of small hotels/motels to install low-flow showerheads. We also guide the owners/operators to participate in other statewide programs (e.g., Express Efficiency) that will provide financial assistance to install other types of energy efficiency improvements.

6. EVALUATION, MEASUREMENT AND VERIFICATION PLANS

This section discusses our approach to performing the evaluation, measurement and verification work for the Lodging Industry Energy Efficiency Program and to reporting on program progress.

6.1 APPROACH TO EVALUATION, MEASUREMENT AND VERIFICATION

As part of the implementation plan that we prepare for the Lodging Industry Energy Efficiency Program, we prepare a plan for measuring and evaluating the program's effects, including the savings that result. Our preliminary outline of that plan is presented here. A more detailed plan would be prepared for the implementation plan.

At the end of the program, we use the data in the tracking system (discussed in Section 6.2) to prepare an evaluation of the program's effects. This evaluation will include information about all activities undertaken as part of the program, including the number of lodging facilities that were marketed to.

To measure and evaluate the effects of the program, we assess the number of small hotels and motels who actually implemented the energy efficiency improvements that were recommended to them during the site visits. During the implementation of the program, we collect data on participants that we enter into a program tracking system. For purposes of our evaluation effort, we collect additional information through telephone surveying in which we ask visited lodging facilities about the types of energy efficiency improvements that they have made in response to the recommendations they received.

Several types of indicators of the program's effects will be considered in the evaluation. Most immediately, we measure the number of small hotels and motels who have implemented one or more of the recommendations for energy efficiency improvements that we gave them during the site visits. We will have collected the information for making this measurement during the course of the program.

For those hotels/motels that implemented energy efficiency improvements in response to our recommendations, we estimate the savings that are being achieved in electricity and gas usage. This will include developing estimates of savings for improvements to the following:

- Indoor lighting
- Outdoor lighting
- Water heaters
- Boilers

- Air conditioners
- Windows (e.g., film)
- Showerheads
- Energy management system

To make the estimates of savings, we use information about the characteristics of the particular facility, the number of measure units installed, and unit energy savings estimates from published sources (e.g., CEC's Database for Energy Efficient Resources (DEER)), from CPUC-approved utility estimates, and from our own in-house data. (Note that ADM was a subcontractor on the project team that prepared the latest version of the DEER, and therefore are completely familiar with the energy savings estimates in that database and how they are derived.)

6.2 REPORTING REQUIREMENTS

Although we have procedures in place for implementing the Lodging Industry Energy Efficiency Program, we do need to coordinate our work with that of the utilities and other parties who have programs that may also involve improving energy efficiency at small hotels/motels. Accordingly, we prepare an implementation plan at the start of the program that specifies the process and procedures that we will be using to implement the program and to coordinate our work with that of others. We submit this plan to the CPUC and the CPUC-designated contract manager for review and approval.

From our work in implementing and evaluating other energy efficiency programs, we know the importance of having good information in a program tracking system in order to track the progress of the program and to evaluate its effects. For the Lodging Industry Energy Efficiency Program, we already have in place the system for tracking the work that we developed for the Lodging Industry Energy Education Program that we conducted for SoCalGas. This tracking system is a full system that includes procedures, policies, protocols, forms, data entry and the data storage methods. The system is up and running and will require little modification to tailor it to meet the data collection and reporting requirements involved our implementing the Lodging Industry Energy Efficiency Program.

We use the system to track specific types of information that enable us to evaluate the progress of the program and our efforts. The information that we track includes the following:

- Name and address of each lodging facility visited;
- Utilities serving the facility and electricity and gas account numbers for each facility;

- Basic characteristics of hotel/motel (e.g., number of rooms, square footage); and
- Energy efficiency measures recommended for the facility.

During the course of the program, we use the tracking system to prepare quarterly reports that detail the previous quarter's activities and progress towards meeting the goals of the program. Each quarterly report includes information on the number of hotels/motels contacted, their characteristics and locations.

7. DESCRIPTION OF ADM'S QUALIFICATIONS

This section provides information on the qualifications of ADM Associates and of the personnel who will be the staff for the Lodging Industry Energy Efficiency Program.

7.1 ADM'S QUALIFICATIONS

Our ability to implement the Lodging Industry Energy Efficiency Program is based on our considerable experience in working with small business firms to improve energy efficiency. Since beginning business in 1979, ADM Associates, Inc. has worked with utilities throughout the country to implement large-scale programs to help small commercial firms use energy more efficiently.

The Lodging Industry Energy Efficiency Program that we are here proposing is patterned after the Lodging Industry Energy Education Program that ADM has been implementing for Southern California Gas Company since 2000. Through the Lodging Industry Energy Education Program, we visited hotels/motels in SoCalGas's service territory and offered their operators hands-on assistance to identify ways in which they can improve energy efficiency and save energy in their facilities. The Lodging Industry Energy Education Program has demonstrated that a hands-on approach is a very effective approach to getting small business owners to think about energy and to take actions to improve energy efficiency. We visited over 900 lodging facilities during 2000 and have visited over 400 more in 2001. The success of the Lodging Industry Energy Education Program argues for extending the same approach to other small hotels and motels throughout the state.

ADM's qualifications are based more generally on long experience in working with small businesses to improve the energy efficiency of their operations. We have conducted programs to market energy efficiency services to small business firms for various clients, including the California Energy Extension Service, the Bonneville Power Administration, Entergy Services, Northern States Power, El Paso Electric, and Colorado Springs Public Utilities Department.

- **Mobile Energy Clinic**

For: Southern California Gas Company

The Mobile Energy Clinic and Diagnostic Services Program is a program that ADM is implementing for SoCalGas that is focused on improving energy efficiency for small businesses by making no-cost/low-cost improvements for energy efficiency and by providing diagnostics of energy-using equipment for small businesses. Small businesses that participate in this program have actual no-cost/low-cost improvements made to their equipment. They also

have their HVAC performance tested, condensor coils cleaned, filters changed, lighting systems evaluated, and other energy using equipment such as water heaters, compressors and process equipment checked for proper use. Owners/managers are given a checklist of other energy efficiency actions that they can take.

- **Upstream High-Efficiency Gas Water Heater Program**

For: Southern California Gas Company

Since 1999, ADM has been under contract to SoCalGas to implement an upstream high efficiency gas water heater program. The purpose of this program is to increase the sales of higher efficiency gas water heaters by working with manufacturers, wholesaler/distributors, water heater dealers, and plumbing contractors throughout SoCalGas's service territory. Our work includes meeting with the market actors, preparing point-of-purchase materials for retailers, and providing incentives.

- **Beverage Vending Machine Program**

For: Southern California Edison Company

Under contract with SCE, we are implementing an Energy Savings Program for Beverage Vending Machines. We are installing VendingMisers™ or time clocks (as appropriate) on 3,400 vending machines in SCE's service territory. The control strategies are defined by (1) whether the vending machine is lighted and (2) whether the location of the machine will permit use of a time clock or requires use of a VendingMiser™. Most of these savings will go to small commercial customers, who are a particular target for the program.

- **Duct Efficiency Programs**

For: Pacific Gas and Electric
Southern California Edison
Southern California Gas
San Diego Gas and Electric

Under the California Board for Energy Efficiency's third party program, ADM was under contract with the four major investor-owned utilities in California (i.e., Pacific Gas and Electric, Southern California Edison, San Diego Gas and Electric, and Southern California Gas) to implement residential duct efficiency programs throughout California. The Duct Efficiency Programs were aimed at institutionalizing good duct design and establishing retrofit duct repair as a component of HVAC maintenance. Through the Duct Efficiency Program, we provided HVAC and/or sheet metal contractors with the information, procedures, and technologies that they could use to market

duct leakage inspection and repair services to residential single-family and multi-family houses. Through the program, contractors were educated and trained on how to provide duct inspection and repair services as a viable business venture. Contractors were taught new techniques and procedures that were explicitly designed under this program in order to be effective and not too expensive. Contractors who participated in the programs were also assisted in identifying households who are interested in having their duct system inspected and repaired.

- **RCP Training**

For: Southern California Gas
Southern California Edison

ADM is conducting training workshops to provide training to HVAC contractors to better equip them to participate in the Residential Contractors' Program. One aspect of the training is to provide training in central air conditioner/central heat pump diagnostic tune-up, duct testing and duct sealing in conjunction with SCE/SoCalGas Installation Standards. The other aspect is to provide an overview of the RCP fulfillment process from consideration of installation of energy efficiency measures through completion of work and contractor payment. This overview includes proper completion of program-related paperwork, including Incentive Voucher/Application and Customer Information and Declaration forms.

- **Local Energy Assistance Program**

For: Southern California Edison
Pacific Gas and Electric
Southern California Gas

ADM developed a program that we implemented throughout California to provide assistance to the planning departments in selected communities to encourage energy efficiency in new industrial and commercial developments that are being proposed in those communities. This program included directly influencing specific development plans and providing assistance to the planning departments of the local governments to plan/approve planing and zoning areas, based on energy use as well as other infrastructure criteria presently used. We also disseminated information regarding the results of these energy planning activities to other communities. Our program in California was funded at \$1.2 million by the major utilities (i.e., Pacific Gas and Electric, Southern California Edison, and Southern California Gas).

- **Energy Efficiency Site Surveys of Commercial, Industrial, and Agricultural Facilities**

For: Pacific Gas and Electric

In this project for PG&E, we are conducting surveys of commercial, industrial, and agricultural customer facilities to identify and analyze the energy efficiency opportunities using the 1-2-3 tiered approach to energy conservation. For Tier 1, we identify and analyze the no-cost energy efficiency opportunities in each customer facility. For Tier 2, we identify and analyze the low-cost energy efficiency opportunities in each customer facility. For Tier 3, we identify and analyze customer facilities with a view to identifying energy efficiency opportunities that will require major financial investments on the part of the customers. All recommendations target and prioritize measures and technologies that deliver both immediate and long-term peak-period kW demand savings and annual kWh and therm savings.

- **Energy and Water Efficiency Services Support**

For: Colorado Springs Utilities

Under this contract with the City of Colorado Springs Utilities, ADM provided energy and water efficiency services for CSU's industrial and large commercial customers. We provided feasibility evaluations for energy and water efficiency projects and provided design plans for energy and water efficient projects. In addition, we provided training on energy and water efficiency projects for CSU staff.

- **Technical Support to Demand Side Management Unit**

For: Jamaica Public Service Company, Ltd.

Under a contract with the Jamaica Public Service Company, ADM is providing technical support to JPSCo's Demand Side Management Unit. We have provided a Resident Consultant who works with JPSCo staff in planning demand-side management programs for JPSCo's customers. Subject areas for which we are providing technical support include program planning and implementation, cogeneration feasibility studies, energy auditing, building codes, simulation modeling, monitoring, and program evaluation.

- **Technical Audits for Large Industrial Customers**

For: Power Agency of California

Under contract with the Power Agency of California, we conducted audits of large industrial electricity customers in order to identify appropriate energy efficiency improvements. To support this activity, we developed the audit

form to be used in data collection, conducted on-site interviews of plant personnel on facility operations, collected other relevant data on-site, evaluated the collected data, and prepared engineering estimates of the energy savings for energy efficiency improvements for each of the audited facilities. Estimates of expected savings were developed through engineering calculations or through simulations with computerized energy analysis models.

- **Business Energy Advocates Program for Small Business**

For: California Energy Extension Service,

ADM provided marketing and technical support services on energy conservation for a program to encourage small business firms in California to adopt techniques and technologies that reduce energy consumption and costs. The program was also intended to reduce the barriers encountered by business firms in gaining access to energy management techniques and practices. We identified energy conservation measures that are particularly applicable to given types of businesses and supported their applications for utility company incentive payments and low-interest small business loans.

- **Commercial Audits Project**

For: Entergy Services, Inc.

For Entergy, we performed the Commercial Audits Project. We performed on-site audits at about 650 commercial facilities throughout Entergy's service area. Using the data collected through these audits, we prepared customer-specific DOE-2 analyses of energy savings from conservation measures. We prepared audit reports for the individual customers and also aggregated the data to prepare system-level estimates of the saturations of various end-use technologies and DSM measures.

- **Energy Audit Services for Small and Medium Commercial and Industrial Customers**

For: El Paso Electric

For El Paso Electric, ADM provided energy audit services to its small- and medium-size commercial and industrial customers. We conducted energy audits for approximately 250 small C&I customers and for approximately 75 medium C&I customers. The audit services included collecting data on-site, preparing an analysis of energy use and potential energy efficiency measures (using our *CPA 123* model), and preparing an audit report for each customer audited.

Our ability to inform owners/operators of small hotels and motels about energy efficiency opportunities derives from our hands-on experience in collecting and analyzing data on energy use for commercial facilities.

- We have conducted energy audits on nearly 3,000 commercial and industrial facilities for such clients as Niagara Mohawk Power, Entergy Services, Northern States Power, El Paso Electric, Wisconsin Electric Power, Iowa Southern Utilities, Centerior Services Company, the Bonneville Power Administration, San Diego Gas and Electric, and Rochester Gas and Electric.
- We have conducted on-site surveys of nearly 10,000 commercial and industrial facilities for clients such as Entergy Services, Northern States Power, Union Electric, Central Illinois Public Service, Florida Power and Light, Alabama Power Company, El Paso Electric, the Bonneville Power Administration, Southern California Edison, Pacific Gas and Electric, the California Energy Commission, the Sacramento Municipal Utility District, San Diego Gas and Electric and other utility companies.

7.2 KEY PERSONNEL

This program requires expertise in market analysis and program design and implementation. Our team for this program provides these required capabilities.

- The principal point of contact between the CPUC's designated Contract Manager and the project team is ADM's project manager, Mr. Taghi Alereza. Mr. Alereza will provide overall technical leadership and will ensure that excellent staff support will be available to the project. He will direct the program design efforts and will be responsible for liaison with the Contract Manager.
- Market analysis and research and measurement and evaluation activities will be directed by Dr. Donald Dohrmann, who is director of economic studies at ADM.
- The day-to-day program manager will be Dr. Seran Thamilsaran, who is a Senior Engineer at ADM.

Short biographical sketches for these and other key personnel for the project are provided in the following paragraphs. Full resumes are provided in Section 10, Attachments.

Taghi Alereza, P.E., who is President of ADM, will be the Principal-in-Charge of the work. Mr. Alereza is a nationally recognized expert in building energy simulation and modeling. He has pioneered the development of several state-of-the-art simulation procedures and models. He developed the variable-base-degree-day method documented in the ASHRAE Handbook, and he was

responsible for the development of the first hourly simulation model to operate on microcomputers. Mr. Alereza pioneered on-site data collection in 1975 for the Federal Energy Administration, and managed the first commercial sector on-site data collection effort in 1977 for the California Energy Commission. Over the past twenty-five years Mr. Alereza has directed numerous energy-related data collection and analysis projects for the SCE, PG&E, SDG&E, Southern California Gas Co., SMUD, the California Energy Commission, and various other utilities and public and private clients. He has been responsible for the on-site data collection and energy analysis of over 15,000 buildings, with a budget of over \$20 million. Some of these specific projects include:

- Directed the Pacific Northwest Non-Residential Survey. The project was conducted in four states. Several utilities were involved, and the budget was over \$1,900,000.
- Directed a non-residential survey and end-use monitoring for Entergy Services, Inc. The projects were conducted in four states, under four separate operating utility companies. The combined budget was \$1,600,000.
- Directed non-residential surveys and retention studies for Southern California Edison, with a combined budget of over \$1,800,000.

Mr. Alereza holds a Bachelor of Mechanical Engineering degree from Auburn University and has completed an MS and the coursework for D.Sc. in mechanical engineering from the George Washington University. He is a member and past chairman of ASHRAE Technical Committee 9.6 (Energy Utilization), which is responsible for developing and applying protocols for assessing energy use in buildings, and the cognizant TC for the ASHRAE Standard 90.2. He is a registered professional engineer in California.

Dr. Sabaratnam Thamilseran a Senior Mechanical Engineer with ADM Associates, Inc., will serve as the day-to-day project manager. Dr. Thamilseran's responsibilities include energy auditing and analysis, DOE-2 simulation and analysis of energy use, assessing energy savings and writing technical reports for industrial and commercial buildings. He was responsible for the development of energy auditing and measure evaluation procedures conducted for the Lodging Industry Education Program conducted for SCG. Under this project he also conducted staff training, reviewed audit reports, and developed the database for program evaluation. Dr. Thamilseran has extensive experience in energy simulation, modeling and analysis of residential and commercial buildings, using both CALRES and DOE-2. He has also been involved in conducting audits and technical evaluations of energy conservation opportunities, building HVAC simulations and baseline model development for commercial buildings for El

Paso Electric, Portland General Electric and Southern California Edison. As a participant in the Texas state funded LoanSTAR program, he performed energy efficiency evaluations and the commissioning of energy conservation measures. Examples of specific projects that he has participated in include:

- Performed DOE-2 simulations of non-residential buildings for the Energy Audits project conducted for El Paso Electric Co.
- Performed DOE-2 simulations of commercial buildings for the evaluation project conducted for Northeast Utilities.
- Conducted on-site surveys and performed DOE-2 simulations of commercial buildings for the New Construction Program evaluation conducted for Portland General Electric Co.

Dr. Thamilsaran earned his Ph.D. in Mechanical Engineering, specializing in Thermal Sciences and Energy Management, from Texas A&M University. He earned his MEng from the Asian Institute of Technology in Thailand, and a B.S. in Mechanical Engineering from the University of Peradeniya in Sri Lanka.

Dr. Donald Dohrmann is a Principal of ADM Associates and Director of Economic Studies. He is responsible for program design and marketing activities. Dr. Dohrmann has technical expertise in economics, survey design, and statistical analysis. He was responsible for preparing the designs and conducting the data analysis for surveys of building departments and homebuilders that ADM conducted during a Residential Building Standards Confidence and Sensitivity Study for the California Energy Commission. He has also developed and applied analytical methodologies for evaluating DSM programs, including evaluations of Portland General Electric's commercial new construction programs, Northern States Power's high efficiency motors and adjustable speed drives programs, Pacific Gas and Electric's Commercial New Construction Program and its Nonresidential Energy Management Services Programs. He has been responsible for designing the statistical sampling plans for surveys of households and commercial firms that ADM has conducted for various companies, including Pacific Gas and Electric Company, Southern California Edison Company, the Bonneville Power Administration, Florida Power and Light, and other utilities. He has also been responsible for preparing and conducting the analysis of the data collected in these surveys. Dr. Dohrmann received his B. S. in economics from Iowa State University and his M. A. and Ph. D. in economics from Yale University.

Muginin Lukito is a Mechanical Engineer with ADM Associates, Inc. His responsibilities include site surveys, building energy end-use analysis, technical evaluation of energy conservation retrofits in commercial and industrial

applications, and coordination of surveys for energy efficiency programs. At ADM, Lukito is currently working on the Public Interest Research (PIER) Energy Efficient Low Income Housing Program. For this project, he has performed a preliminary technical evaluation of the attic water pre-heater, and he is currently involved in the temperature study of existing Habitat for Humanity homes. Another project he is involved in is the retro-commissioning of the Arco Arena and Sacramento Airport Terminal A, sponsored by Sacramento Municipal Utility (SMUD), the latter using a building simulation model in DOE-2. He is also currently responsible for coordinating surveys for the Residential Contractor Program (RCP) evaluation sponsored by PG&E, SDG&E and SCE. Prior to joining ADM, Lukito was working as a Graduate Assistant (GA) for the University of Notre Dame Industrial Assessment Center (NDIAC) while completing his post-graduate studies. The primary goal of this program sponsored by the U.S. Department of Energy is to provide free energy, waste and productivity assessment for small to medium size local manufacturing companies. In this capacity, he was responsible for coordinating site visits, managing ongoing projects, training new members, and being a teaching assistant for the class offered by the Aerospace & Mechanical Engineering Department in support of the program. Before becoming a GA, he also participated in the program as an undergraduate. During his tenure at the NDIAC, he participated in more than 60 audits. He has also written numerous technical reports related to these assessments.

Angelo Mineo, who is a Senior Engineer at ADM, has considerable experience in on-site data collection and end-use monitoring. For the past eight years at ADM, he has conducted on-site data collection and end-use monitoring for many major utilities in the U.S. As an end-use monitoring specialist, he has conducted end-use metering of many commercial and industrial buildings. His experience includes on-site data collection, installing, inspecting and verifying monitoring equipment and validating collected data for our projects for B.C. Hydro, Northern States Power, Entergy Services, Inc., SCE and Los Angeles Department of Water and Power. Examples of specific tasks that Mr. Mineo has conducted include:

- Performed data collection and end-use monitoring for the Commercial Program Evaluation conducted for Central Power and Light Co. in Texas.
- Performed data collection and end-use monitoring of fixed and adjustable-speed motors for the evaluation of Northern States Power's Motors program.
- Performed data collection and end-use monitoring of Commercial buildings in Arkansas, Texas, Mississippi and Louisiana for the development of end-use load shapes for Entergy Services Co.

- Has been conducting on-site inspections and data collection for the Nonresidential Retention study being conducted for Southern California Edison Co. for the past 6 years.

Mr. Mineo earned his Bachelor of Science in Electrical Engineering from California State Polytechnic University.

Mahmoud Fouladi, a Mechanical Engineer at ADM, has considerable experience in performing energy audits and building energy analysis, recommending energy efficiency measures and providing quality control for various commercial and industrial projects. During the past seven years he has participated in more than ten major commercial & industrial data collection projects conducted by ADM. He has been conducting on-site data collection on commercial and industrial facilities as a member of the field staff for the Non-Residential Measure Retention Study that ADM has been performing for Southern California Edison for the past five years. Other projects that Mr. Fouladi has participated in include:

- Performed on-site data collection and monitoring of lighting and HVAC motors for three projects conducted for Central Power and Light Co. in Texas.
- Performed on-site data collection for the evaluation of the New Commercial Construction Program conducted for Portland General Electric Co. The on-site data were used to develop DOE-2 simulations.
- Performed on-site data collection of commercial buildings for the Saturation Study conducted for Southern California Edison Co.

Mr. Fouladi earned his M.S. degree in Mechanical Engineering from George Washington University and his B.S. in Mechanical Engineering from Howard University.

Cyrus Davehlo is a Mechanical Engineer at ADM. For the past ten years, Mr. Davehlo has been a field engineer and trainer for the surveys of residential, commercial and industrial customers that ADM has conducted for Georgia Power, Alabama Power, Wisconsin Electric Power, Northern States Power, Portland General Electric, and many other utilities. He will be participating in on-site data collection and end use monitoring of lighting and supply fans. He has personally collected on-site data for over 1,500 buildings in the last ten years. In this work, he has collected data on industrial processes, HVAC and lighting systems in a wide variety of commercial and industrial facilities. Examples of specific projects that Mr. Davehlo has participated in include:

- Conducted on-site data collection for two major commercial saturation studies conducted for Florida Power and Light Co.

- Conducted on-site data collection and energy audits of commercial buildings for El Paso Electric Co.
- Conducted on-site data collection for non-residential buildings for two projects conducted for Northeast Utilities.
- Conducted on-site data collection for energy audits conducted in Arkansas, Louisiana, Mississippi and Texas for Entergy Services Co.

Mr. Davehlo graduated from Florida Atlantic University with a B.S. degree in Mechanical Engineering.

Richard Burkhardt serves as the Senior Technical Editor and desktop publisher at ADM Associates, Inc. As technical editor, his responsibilities include copy-editing, graphic design and production for documentation, marketing materials, survey questionnaires, and web page layout and design for ADM projects. He is responsible for the production of a quarterly newsletter and accompanying website for the Southern California Gas Co. *Lodging Industry Education Program*. He was in charge of designing and publishing marketing materials for the Duct Efficiency Training Program, Upstream High-Efficiency Gas Water Heater program and several other energy efficiency marketing programs performed for California utilities. He was responsible for the production of a series of Commercial / Industrial site audit reports for Entergy Services, Inc. For Kansas City Power and Light Co. he developed automated templates using the data linking functions in Microsoft Word and Excel to generate site reports, and was responsible for final copyediting and cleanup of the reports. He has also performed similar work for projects for Southern California Edison Co. He is well versed in the advanced techniques for a wide variety of production software packages and web page design software, under multiple operating systems. Prior to joining ADM, he worked as a freelance editing assistant, performing editing, graphic production and page layout for a series of operating manuals for computerized production equipment. Mr. Burkhardt earned his B.A. degree in Communications from California State University, Fullerton.

Additional ADM field staff who will perform work on this project include:

- Steve Lee
- Hao Ly
- Ha Nguyen
- Van Thanh Nguyen
- Kenny Thai

- Khoi Tran
- Leon Tran

8. TIMELINE FOR PROGRAM IMPLEMENTATION

Our proposed timeline for implementing the Lodging Industry Energy Efficiency Program is shown in Table 8-1.

Table 8-1. Timeline for Implementing Lodging Industry Energy Efficiency Program

<i>Activity</i>	<i>Target Date</i>
Program Begins	5 Days After Contract Approval
Program Implementation Plan	3 Weeks After Project Start Date
Evaluation, Measurement & Verification Plan	5 Weeks After Contract Approval
First Quarter Report	3.5 Months After Contract Approval
Second Quarter Report	Quarterly
Third Quarter Report	Quarterly
Fourth Quarter Report	Quarterly
Fifth Quarter Report	Quarterly
Sixth Quarter Report	Quarterly
Program Completion	December 2003

9. PROGRAM COST PROPOSAL

Our cost proposal for the Lodging Industry Energy Efficiency Program is detailed in Table 9-1.

Table 9-1. Budget Summary

Item	First Year Cost	Second Year Cost	Total Cost
Administrative Costs			
Labor	\$ 34,475.00	\$ 64,025.00	\$ 98,500.00
Benefits			\$ -
Overhead			\$ -
Travel costs	\$ 1,050.00	\$ 1,950.00	\$ 3,000.00
Reporting costs			\$ -
Materials & Handling	\$ 2,975.00	\$ 5,525.00	\$ 8,500.00
General and Administrative costs	\$ 3,850.00	\$ 7,150.00	\$ 11,000.00
Subcontractor costs (include same line items)			\$ -
IOU Administrative Fee (only for non-IOU programs)	\$ 10,325.00	\$ 19,175.00	\$ 29,500.00
Direct Implementation Costs			
Itemized (may be estimated)			
• Energy Audits - 1,100 sites @ \$290 / site	\$ 111,650.00	\$ 207,350.00	\$ 319,000.00
• Rebates for low-flow showerheads - 20,000 rebates @ \$7.50 / rebate	\$ 52,500.00	\$ 97,500.00	\$ 150,000.00
Evaluation, Measurement and Verification Costs			
Direct labor		\$ 24,000.00	\$ 24,000.00
Other direct costs	\$ -	\$ -	\$ -
Other Costs			
TOTAL BUDGET	\$ 216,825.00	\$ 426,675.00	\$ 643,500.00

The Lodging Industry Energy Efficiency Program will be conducted in the service territory of PG&E. The budget allocation by program year and type of service is shown in Table 9-2.

Table 9-2. Budget Allocation by Utility Service Territory

Program Year	Measure	Quantity	Budget
2002	Lodging Audits	400	\$ 139,163
2002	Low Flow Shower Head Rebates	6,000	\$ 78,240
2003	Lodging Audits	700	\$ 243,536
2003	Low Flow Shower Head Rebates	14,000	\$ 182,561
Total			\$ 643,500

Our proposed payment schedule is shown in Table 9-3.

Table 9-3. Proposed Payment Schedule

#	<i>Event</i>	<i>% Payment</i>
1	Acceptance Of Final Program Implementation Plan	25%
2	Acceptance Of Evaluation, Measurement And Verification Plan	10%
3	Acceptance Of Quarterly Reports (Payments To Be Determined Proportional To The Number Of Implementations Performed)	50%
4	Final Payment Based On Evaluation, Measurement And Verification Results	15%

10. ATTACHMENTS

Taghi Alereza
Principal & Director of Engineering

Mr. Alereza, a Principal of ADM Associates, Inc. and Director of the Engineering Division, is a recognized expert in energy analysis, energy modeling, energy forecasting, and system evaluation. He has been responsible for the development of several state-of-the-art contributions in the energy modeling field. These contributions have centered on energy analysis and energy forecasting for the residential, commercial, and industrial sectors. During his 25 years of professional experience, Mr. Alereza has successfully managed highly technical projects for over thirty major utility companies, the Department of Energy, California Energy Commission, and Electric Power Research Institute.

California Statewide Programs

Mr. Alereza has led ADM's effort to develop and implement two statewide residential programs during the 1998 program year. He conceived and developed the "Residential Duct Efficiency Program," which was implemented in the service territories of Pacific Gas and Electric, Southern California Edison, Southern California Gas and San Diego Gas and Electric. Mr. Alereza directed the development of the procedures for duct leakage tests and repairs, the training curriculum for HVAC contractors, marketing materials and program evaluation protocols. The Duct Repair program is being considered as an item with the most amount of incentives in the 1999 residential SPC program. Mr. Alereza also conceived the Local Energy Assistance Program (LEAP), which was implemented in the PG&E, SCE and SCG service areas. This program provided extensive training to developer/builders, local government staff and elected officials.

Program Evaluation

Mr. Alereza has managed several commercial, industrial and residential impact evaluations for Detroit Edison, Portland General Electric, Pacific Gas and Electric, Delmarva Power, BC Hydro, and Consumers Power Company. ADM designed the sample for participants and non-participants, collected the data, prepared baseline simulations of HVAC energy use, evaluated the energy impacts of the programs, and conducted all metering-related work, including installing, maintaining and removing metering equipment, collecting and verifying metered data on energy use and using these data to calibrate procedures for simulating such energy use.

Mr. Alereza has also managed various new construction evaluations for Pacific Gas and Electric, San Diego Gas and Electric, Southern California Edison Company and BC Hydro. ADM assessed the actual (realized) impact of several post-implementation program parameters, first-year annual energy savings, load shape impacts, net-to-gross and persistence impacts, incremental customer equipment and installation costs, and total customers' costs.

Pacific Gas and Electric's Commercial New Construction Program entailed an evaluation of realized savings for participant and non-participants using data on building equipment and characteristics; economic and attitudinal characteristics of the businesses involved; and billing and/or end-use metered data. In addition, monitoring equipment was installed in a subsample of the buildings to measure end-use electricity under "as operated" conditions.

ADM Associates provided analysis of the impacts of SDG&E, SCE and BC Hydro's energy efficiency programs. We conducted more than 300 high-resolution on-site surveys and correlated the results to billing data and local weather data. SDG&E and SCE's evaluations included additional parametric runs compared the energy use of the buildings under Title 24 conditions, as-built conditions and per incentivized measures. The data from the decision makers' survey was combined with the results of the DOE-2 parametric analysis to perform the overall net-to-gross analysis.

End Use Metering

Mr. Alereza has been the principal-in-charge on monitoring projects that collected data from more than 500 buildings in various locations.

He is currently managing Phase I and Phase II of an end-use metering project for Entergy Services Inc. ADM is performing this project to provide baseline end-use information for commercial buildings in Entergy's service area. We are installing monitoring equipment at 40 commercial buildings throughout Entergy's four-state service area and will be collecting end-use data from these buildings over the next year. End uses being monitored include space heating, air conditioning, and lighting, as well as end uses important in particular types of buildings (e.g., refrigeration in grocery stores).

As part of Pacific Gas & Electric Company's Collaborative Process program verification efforts, ADM conducted short-term monitoring of end uses in commercial and industrial buildings, both before and after conservation measure implementation. Data were analyzed to identify actual energy savings associated with each end use at each site and included in a comprehensive summary report prepared for each site. For Southern California Edison, ADM provided technical support for end-use metering of 50 commercial buildings. For San Diego Gas & Electric Company, ADM conducted its commercial end use and thermal storage monitoring project. We installed data acquisition systems at over 100 selected buildings with chillers and/or thermal storage systems in SDG&E's service territory. For all projects, ADM was responsible for recruiting the buildings for the program, preparing the meter installation plan, verifying the meter installation, and for validating the end-use data collected. Data validation is accomplished using our Load Profile Viewer, a custom-designed software program for reviewing and validating end-use load profile data. Installed equipment included current transformers, Btu meters, flow meters and temperature sensors.

He was responsible for the development of Data Analysis and Reporting System (DARS), a microcomputer software package that graphically displays metered end-use load data. DARS was developed as a coordinated set of SAS (Statistical Analysis System) programs that can extract end use load data from a mainframe data base and prepare the data for analysis and reporting. For simple reporting purposes, DARS can produce daily load profile plots, percent energy distribution pie charts, and energy distribution bar charts. For data analysis, DARS can produce load profile plots for various options, including individual site plots, plots for distributions across monitored sites, and plots for weighted averages across sites.

Industrial End-Use Data Analysis

Mr. Alereza managed two major industrial data collection and DSM evaluation projects for Bonneville Power Administration and Wisconsin Electric Power Company. The BPA project included development of a comprehensive database of available industrial DSM measures and their impact on industrial energy use by end-use. The WEPCO project included development of data collection procedures and collection of detailed industrial end-use inventory for 150 industrial facilities in Wisconsin. Also included in this project is a detailed analysis of end-use and process energy use and development of an industrial end-use analysis model.

Commercial Building End-Use Energy Data Collection and Analysis

For the past 15 years, Mr. Alereza has been responsible for data collection and analysis of several thousand commercial facilities throughout the United States. He has managed two major data collection and analysis projects on non-residential buildings for the Bonneville Power Administration. He has managed similar projects for many utilities including Pacific Gas & Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, Florida Power & Light, Alabama Power, Rochester Gas & Electric Company and Union Electric. He has also been responsible for the development of several analysis models being used by many researchers.

Simplified Calculation Method (SCM)

Mr. Alereza developed the Simplified Calculation Method (SCM) which is the commercial building energy standard compliance tool for the California Energy Commission. The concept used in SCM was based on the variable-based degree-day method which was originally developed by Mr. Alereza for the National Bureau of Standards. The SCM provides capabilities for analysis of daylighting, evaporative coolers, and solar water heaters.

Building Energy Use Determination

Mr. Alereza was the program manager on a program which resulted in the development of a methodology for determining energy use in residential and commercial buildings in the U.S. Army facilities. This methodology employs

non-computerized procedures and renders computer approach accuracy without the cost and the effort involved in the computer simulation. He was a major contributor to a program which evaluated the correlation between building component structure and energy consumption in new and old residential buildings in the Baltimore/Washington area in 1972. The analysis techniques and concepts developed in this program were expanded and served as a basis for a similar evaluation of single- and multi-family housing in 10 geographic regions of the United States. Mr. Alereza was the principal investigator on this program, and his responsibilities included the technical direction of tasks which defined typical buildings for each location, determined their energy consumption patterns, and evaluated the energy savings that could be achieved through selected structural modifications.

Building Infiltration Measurement and Modeling

Mr. Alereza had participated in several outdoor air infiltration and ventilation studies. He modified and extensively used the infiltration model developed by the National Research Council of Canada to develop a simplified hourly infiltration model. He also developed another air infiltration model which calculates the outside air infiltration into residential buildings as a function of the building characteristics, wind velocity, and indoor/outdoor temperature differential. The parameters for this model were evaluated by using SF6 Tracer gas decay rates in residences in Baltimore, Chicago, Denver, St. Louis, and Washington, D.C. Later, this model was used to assess the indoor air quality as a function of outdoor air quality and the air change rate.

Commercial Electricity Demand Forecasting

Mr. Alereza was the program manager and a key technical contributor for a project which resulted in the development of an electricity energy use and demand forecasting model for the California commercial sector. Also included in this project was an inventory of physical and energy use characteristics of existing buildings and end-use devices in the commercial sector. This inventory was obtained through three phases of data acquisition: a mail survey, an on-site inventory survey, and spot metering of end-use devices.

Energy Use Patterns Analysis

Mr. Alereza provided technical support in the development of a comprehensive methodology for analyzing energy use patterns for conservation potential at the community level, an evaluation of the impact of time-of-day price structures on commercial and industrial sectors, the development of a regional commercial sector energy forecasting model, evaluation of hot water energy use in hospitals, and an assessment of energy use and energy conservation potentials in public buildings.

Solar Energy Driven Rankine Cycle Engines

Mr. Alereza has also been active in the solar energy field. He was a key contributor to a program which assessed the feasibility of utilizing Rankine cycle engines and absorption cycle equipment for the cooling of buildings. He contributed to nearly every phase of the study which addressed working fluids, solar collectors, and heat sinks as well as a comparative evaluation of the Solar Rankine Cycle, Solar Assisted Rankine Cycle, and Solar Absorption cooling concepts.

Publications

Mr. Alereza has authored over twenty research papers which he has presented to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). He has also served as the technical committee (TC) chairman on energy utilization. This committee is the cognizant TC for development of measurement and verification protocols being developed jointly by DOE and ASHRAE. He is the author of, or a principle contributor to, over 50 technical papers or major reports in the areas of energy analysis, energy conservation, and energy forecasting.

Some of the projects to which Mr. Alereza has been a principal technical contributor include:

- Conducting Survey of 500 Commercial Establishments in California, California Energy Commission
- Conducting Survey and Performing EUI Calculations for 60 Commercial Buildings, Southern California
- Conducting Survey of 400 Commercial Buildings in Baltimore, MD, Federal Energy Administration
- Development of Typical Commercial Buildings in California, California Energy Commission
- Development of Building Energy Standards for Residential and Commercial Buildings, State of Alaska
- Development of Non-Computerized Methodology for Building Energy Analysis, U.S. Army Construction Engineering Research Laboratory
- Evaluation of Residential Energy Consumption and Assessment of Technical Innovations Enabling Reduction of Energy Consumption, U.S. Department of Housing and Urban Development
- Development of Variable-Based Degree-Day Energy Calculation Method, National Bureau of Standards
- Energy Use and Electricity Demand Forecasting for the Commercial Sector, Electric Power Research Institute
- Comprehensive Community Planning for Energy Management and Conservation, U.S. Energy Research and Development Administration
- Energy Analysis for the South Florida Region, South Florida Regional Planning Council

- Hot Water Usage in Hospitals, Lawrence Berkeley Laboratory

Prior to forming ADM Associates, Inc., Mr. Alereza was Program Manager of the Western Office of Hittman Associates, Inc.

Mr. Alereza is a graduate from Auburn University with a Bachelor of Mechanical Engineering (B.M.E.), and has completed M.S. and the coursework for a D.Sc. in Mechanical Engineering at George Washington University. Mr. Alereza is a Registered Professional Engineer in the State of California.

Donald R. Dohrmann, Ph.D.
Principal & Director of Economics Studies

Dr. Dohrmann, a Principal of ADM Associates and Director of the Economics Studies Division, has 25 years of business and academic experience in economic analysis, survey design, and statistical analysis. He has also been responsible for evaluating the economic viability of new energy conservation technologies and preparing forecasts of the commercial acceptance of these technologies. He has considerable experience in designing studies to collect data on energy use by commercial firms and households, in analyzing the economic factors affecting the choice of energy-using technologies for commercial, industrial and residential buildings, and in forecasting the acceptance of conservation measures for such buildings. He has been the Principal Investigator on several studies that involved designing and executing surveys to collect data on the factors affecting energy use by commercial firms and households. He has been a primary contributor to the development of end-use demand forecasting models for the commercial sector.

Survey Design

Dr. Dohrmann's experience in designing surveys includes:

- For the Bonneville Power Administration, he was the Principal Investigator on a study in which a survey was conducted to collect data on the prices and energy efficiencies on residential appliances. The data collected were formatted into a database for BPA's use in formulating programs to encourage households to choose energy efficient appliances.
- For the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), he has been the principal investigator on two research projects to conduct nationwide surveys to collect and analyze data on the maintenance costs of HVAC equipment.
- For the Electric Power Research Institute, he was the Principal Investigator for a study that evaluated sample survey techniques for collecting end-use data on commercial customers of electric utilities.
- For the Pacific Gas and Electric Company, he prepared the sampling plan for conducting an on-site survey of 675 of PG&E's commercial customers.
- For the California Energy Commission, he evaluated and prepared sampling plans for conducting on-site surveys of nearly 900 commercial customers of Pacific Gas and Electric Company, Southern California Edison Company, and the Sacramento Municipal Utility District.
- For the Sacramento Municipal Utility District, he designed and drew the sample for a mail survey to collect data on the saturations of residential appliances.
- For the California Energy Commission, he was a primary contributor on a project to develop common sampling methodologies that utilities in California can use to conduct mail surveys of their residential and commercial customers.

Energy Technology Economics

Dr. Dohrmann also has conducted a number of studies in which the economic viability of new energy using technologies was assessed. These studies include:

- Preparing an analysis of the economics and market potential of producing hydrogen through coal gasification and through electrolysis.
- Estimating the market potential of newly developed solar cooling technologies.
- Analyzing the economic factors affecting the future equipment needs of electric utilities.
- Estimating the market potential for compressed air storage systems among electric utilities.
- Evaluating the market potential for repowering steam electric generating plants with gas turbines.

Energy Conservation & Load Management

Dr. Dohrmann has conducted several studies in which energy conservation and load management measures were analyzed and evaluated. Examples of the studies include:

- For the U.S. Department of Energy and the Electric Power Research Institute, he analyzed the impacts of time-of-day electricity rates on commercial and industrial firms. He was directly responsible for the design of the sampling methodology used to select 300 industrial and commercial firms for on-site interviews and for the design of the questionnaire used during the interview.
- For the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), he analyzed the costs of maintaining heating, ventilating and air conditioning equipment in office buildings. The data for this analysis were collected through a nationwide mail survey of office buildings that was conducted in conjunction with the Building Owners and Managers Association, International.
- For a major west cost utility, he analyzed the persistence of selected conservation measures among the utility's residential customers.
- For Lawrence Berkeley Laboratory, he conducted an econometric analysis to estimate fuel choice elasticities for the residential sector.
- For the State of Alaska, he evaluated the economics of energy efficiency performance standards for residential and commercial buildings in the state.

Demand Forecasting

Dr. Dohrmann has been a principal contributor on several projects to develop econometric/engineering models for forecasting the demand for electricity and natural gas in the commercial sector.

- For the Electric Power Research Institute, he prepared a report evaluating alternative methods for forecasting additions to the floorspace of different kinds of commercial buildings.

- For the Pacific Northwest Power Planning Council, he prepared an evaluation of different end-use models for forecasting energy use in the commercial and industrial sectors.
- For the California Municipal Utilities Association, he developed the specifications for simplified end-use forecasting models for the residential and commercial sectors.

Before becoming a Principal at ADM Associates, Inc., Dr. Dohrmann worked at Hittman Associates, Inc. and at the Research Center of United Technologies Corporation. He has taught economics at Yale University, the University of San Francisco, the University of Connecticut, and California State University, Sacramento.

Dr. Dohrmann graduated from Iowa State University with a B.S. in Economics. He received his M.A. and Ph.D. in Economics from Yale University.

Safdar Chaudhry, Ph.D.
Senior Mechanical Engineer

Dr. Chaudhry is a Senior Engineer at ADM Associates, Inc. His professional experience emphasizes building energy end-use analysis, development of load management programs for utilities, and technology evaluation in residential, commercial and industrial applications.

Dr. Chaudhry has been involved in new residential community design under the Local Energy Assistance Program (LEAP.) He has participated in evaluation of energy conservation strategies proposed for several cities in California. He has evaluated these strategies for energy and cost savings for developers/builders, city governments and future homeowners.

He developed energy conservation evaluation procedures, monitored field staff, and reviewed recommended energy measures for the Mobile Energy Clinic program conducted for Southern California Gas Company. He also developed energy auditing and measure evaluation procedures conducted for the Lodging Industry Education Program conducted for SCG.

He has participated in the development of technology and performance characteristics, and formulating these characteristics as a function of parameters affecting the performance. He has used these functional relationships in DOE-2 building energy simulation, and other models, including TRNSYS and BLAST.

He has been involved in the following projects, related to Demand Side Management Program Development and Evaluation, Energy Auditing and Analysis, End-Use Load Profiles and Appliance Technology Assessment:

- New Construction Evaluation Program for Pacific Gas and Electric Co.
- Title 24 Plus Program Evaluation for SDG&E
- Technical review for State Schools Energy Conservation Improvements Program for the Office of Local Assistance, Department of General Services.
- Impact evaluation of adding insulation in refrigerated warehouses for Southern California Edison Company.
- Impact Evaluation of the Smart Energy Design Program for Portland General Electric Co.
- New Building Design Program for British Columbia Hydroelectric Company.
- Commercial Building Energy Use Simulation Program for Southern California Edison Company.
- Commercial/Industrial and Residential Audits for ENTERGY Services, Inc.
- On-site surveys of new commercial buildings for the Sacramento Municipal Utility District.
- New Construction Evaluation Program for the Sacramento Municipal Utility District.

- Cooperative study to assess application of geothermal heat pump system in schools.

While a Research Associate at the University of Birmingham, his activities included:

- Development of a computer based automatic control system for energy systems.
- Development of a computer based data acquisition system, and analysis tools to monitor and analyze performance of energy systems.
- Data acquisition, processing and analysis of energy systems.
- Mathematical modeling, and development of energy simulation algorithms and computer codes for a variety of engineering problems.
- Computer simulation of energy systems and performance optimization.

Dr. Chaudhry worked as a Research Fellow at the George Washington University, where he was involved in analysis of energy resources and devices, forecasting, input/output and net energy analysis, life-cycle costing, second law energy analysis and technological assessment. His experience also encompasses management of engineering projects and public administration, including planning, preparation, implementation, evaluation and economic and financial analysis. His work on energy systems have been widely published in the U.S. and abroad.

Dr. Chaudhry has, an M.S. in Mechanical Engineering from George Washington University and a Ph.D. in Mechanical Engineering for the University of Birmingham.

Lon Smith Senior Associate

Lon Smith is a Senior Associate at ADM Associates, Inc., responsible for development and conducting training in the areas of HVAC systems. He has extensive experience in refrigeration, transport and control systems in residential, commercial and industrial buildings. During his previous employment of 20 years with United Refrigeration Inc., Honeywell Inc., and New England Sheet Metal Works, Inc., he has developed an exceptional understanding of not only the theoretical aspects of HVAC and refrigeration systems, but also he has mastered the practical side of these systems as well. In the past, he has provided consultation to HVAC designers, and has conducted training in refrigeration and control systems. Mr. Smith was an instructor at the State Center College District. He taught classes in pneumatic, electrical and electronic controls for commercial, residential and industrial mechanical systems. He has also taught classes on refrigerant types and their application, refrigerant recovery and power distribution systems, and their application to power line carrier transmissions. Some of the projects that Mr. Smith has been responsible for include:

- **Upstream High Efficiency Water Heater Program**, performed for Southern California Gas Co. Mr. Smith was responsible for coordination of wholesalers, verification and payment.
- **Mobile Energy Clinic**, performed for Southern California Gas Co. Mr. Smith was responsible for development of procedures and conducting training of field staff.
- **US Department of Agriculture Laboratory:** Mr. Smith was the design engineer for the control and monitoring system for the laboratory. The system had to maintain plus-or-minus ½ of a degree of dry bulb temperature, and plus-or-minus 1% relative humidity. The system had a direct digital control system that monitors the facility temperature and humidity at multiple locations within the laboratory.
- **The Women's Facility at Chowchilla:** Mr. Smith was the chief design controls engineer on this project. There were over 500 points of control that were interlocked with the monitoring of the facility. These points controlled over 100 VAV boxes, chillers, fans and pumps.
- **The White House:** Mr. Smith participated in the renovation of the chilled water system and the control systems for The White House. The system covered 2 centrifugal chillers, and allied equipment.
- **The Ethiopian Embassy:** Mr. Smith was the principal design engineer for the water-source heat pump and allied control system. This covered 3 multi-story buildings in the embassy compound.

- **Fort Belvoir and Quantico US Marine Base:** Mr. Smith was the principal engineer in the recovery of an excess of refrigerant 502 that would have been released into the atmosphere.
- **The Embassy of France:** Mr. Smith was the principal in the design of the refrigeration system for the wine cellar. The cellar holds over 1,000 bottles, with vintages dating back to the mid-eighteenth century.
- **Hilton Hotels:** Mr. Smith was instrumental in installing and using packaged room controls systems for energy conservation in Hilton Hotels. The first system was installed in the Flamingo Hilton in Las Vegas.
- **Giant Foods:** Mr. Smith was a participant in the study of retrofit refrigerants conducted by Giant Foods. In 1994 Giant Foods undertook a program to remove chlorofluorocarbon refrigerants R-12 and R-502 from their refrigerated cases, and replace them with the more ozone-friendly hydrofluorocarbon refrigerants R134a and R507. The study was done to determine efficiency losses and equipment reaction to the refrigerant changes.
- **U.S. Navy – Paxtuent River Naval Air Station:** Mr. Smith was the principal engineer in the design of the refrigerant sniffers that are installed for the cooling systems on the E3a AWACs aircraft.
- **Anheiser Busch:** Mr. Smith was a principal in the temperature monitoring and control systems for 3 different bottled storage facilities. These facilities are located in Washington D.C., Richmond VA, and Baltimore MD.
- **Bethlehem Steel:** Mr. Smith was a principal in the first conversion of an industrial steel mill, including 5 Bessemer Converters, to digital controls.

Mr. Smith is a licensed Energy Auditor for the Environmental Protection Agency and the California Energy Commission. He earned his Bachelor of Arts in Communications from California State University Fresno.

Sabaratmam Thamilsaran, Ph.D., C.E.M.
Mechanical Engineer

Dr. Thamilsaran is a Mechanical Engineer with ADM Associates, Inc. His responsibilities include site surveys, building energy end-use analysis, technical evaluation of energy conservation retrofits in commercial and industrial applications, and technical evaluation of new residential community design.

At ADM, Dr. Thamilsaran has developed an application for the impacts of street tree canopy and street width for the purpose of reducing the “Heat Island” effects in future communities. He also developed a computerized methodology for these impact evaluations, for use by developers and city planning staff. These efforts were performed under the statewide LEAP program, sponsored by PG&E, SCE and SCG utilities. He has also contributed to Non-Residential Saturation and Measure Retention Studies, Commercial New Construction Evaluation, Commercial Audit and Survey Programs in California, Connecticut, Massachusetts, Portland and Texas.

Prior to joining ADM, Dr. Thamilsaran was a member of the Energy Systems Laboratory’s Building Energy Analysis Division at Texas A&M University and contributed to the success of the Texas LoanSTAR program (a statewide energy conservation and assistance program that used \$98 million in oil overcharge funds to help the public buildings more energy efficient in Texas). While doing his post-graduate studies at Texas A&M University he has also worked for the Energy Analysis and Diagnostic center at Texas A & M University which provides free energy services to industries (a DOE funded research group based at selected universities across the nation to provide free service to small and medium industries in their surrounding area).

Dr. Thamilsaran did his undergraduate work in Mechanical Engineering at University of Peradeniya, Sri Lanka, his MS in Energy Technology from the Asian Institute of technology, Bangkok, Thailand and a Ph.D. in Thermal Sciences and Energy Management in Mechanical Engineering from Texas A&M University. He has written numerous technical reports on energy conservation opportunities in various industrial facilities, and developing baseline models for measuring retrofit savings on several public buildings in Texas. He has also published peer-reviewed journal papers in ASHRAE, ASME and regional conferences.

Mugimin Lukito

Mechanical Engineer

Mugimin Lukito is a Mechanical Engineer with ADM Associates, Inc. His responsibilities include site surveys, building energy end-use analysis, technical evaluation of energy conservation retrofits in commercial and industrial applications, and coordination of surveys for energy efficiency programs.

At ADM, Lukito is currently working on the Public Interest Research (PIER) Energy Efficient Low Income Housing Program. For this project, he has performed a preliminary technical evaluation of the attic water pre-heater, and he is currently involved in the temperature study of existing Habitat for Humanity homes. Another project he is involved in is the retro-commissioning of the Arco Arena and Sacramento Airport Terminal A, sponsored by Sacramento Municipal Utility (SMUD), the latter using a building simulation model in DOE-2. He is also currently responsible for coordinating surveys for the Residential Contractor Program (RCP) evaluation sponsored by PG&E, SDG&E and SCE.

Prior to joining ADM, Lukito was working as a Graduate Assistant (GA) for the University of Notre Dame Industrial Assessment Center (NDIAC) while completing his post-graduate studies. The primary goal of this program sponsored by the U.S. Department of Energy is to provide free energy, waste and productivity assessment for small to medium size local manufacturing companies. In this capacity, he was responsible for coordinating site visits, managing ongoing projects, training new members, and being a teaching assistant for the class offered by the Aerospace & Mechanical Engineering Department in support of the program. Before becoming a GA, he also participated in the program as an undergraduate. During his tenure at the NDIAC, he participated in more than 60 audits. He has also written numerous technical reports related to these assessments.

Angelo Mineo

Senior Electrical Engineer

Angelo Mineo, a senior electrical engineer with considerable experience in the energy management field, is ADM Associates' monitoring engineer. Mr. Mineo is responsible for monitoring projects for several Southern California utilities including Southern California Edison (SCE), Los Angeles Department of Water and Power (LADWP) and San Diego Gas & Electric Co. (SDG&E).

For Northern States Power's Motors and Adjustable Speed Drives Program Evaluation, Mr. Mineo conducted in-depth monitoring of the performance of high efficiency motors and ASDs at 50 sites where high efficiency motors were installed and at another 50 sites where adjustable speed drives were installed. The monitoring approach involved (1) making one-time measurements of voltage, current, and power factor of the ASD/motor and (2) conducting continuous measurements of power over a period of time in order to obtain data to develop load profiles. His responsibilities included installing and removing monitoring equipment, taking one-time measurements, collecting logger data and documenting the installation.

He was responsible for installing, troubleshooting and verifying the installation of on-site monitoring equipment at 77 commercial sites for SCE. The projects entailed monitoring of HVAC, lighting, refrigeration, internal plug loads and cooking.

For LADWP's Residential Air Conditioning Study, Mr. Mineo was responsible for customer recruitment, installation of loggers at 75 residential sites, two years of data collection and equipment maintenance. Data collected at each site included total electric load, A/C load, indoor temperature and outdoor temperature.

Mr. Mineo was involved in installing and troubleshooting load monitoring equipment at over 100 commercial sites for SDG&E. The loads being monitored included HVAC, lighting, thermal storage and process loads.

Mr. Mineo installed monitoring equipment in commercial buildings for B.C. Hydro to monitor pre-retrofit and post-retrofit lighting energy usage. His duties included tracing electrical circuits in buildings and installing and programming data loggers.

His responsibilities as an energy manager have included maintaining and modifying energy monitoring circuits for data acquisition needs, and designing and building electrical control panels, and calibrating, troubleshooting and repairing analog temperature meters. He has been responsible for the performance of time and motion studies to establish efficient systems for work-flow to the customers' needs and construction department.

As an electronic maintenance engineer, Mr. Mineo was responsible for the electrical and electronic plant systems as well as pneumatic systems, improving machinery efficiency and reducing breakdown time.

Mr. Mineo earned his Bachelor of Science in Electrical Engineering from California State Polytechnic University.

Mahmoud Fouladi

Mechanical Engineer

Mr. Fouladi is a Mechanical Engineer with ADM Associates, Inc. His primary responsibilities include conducting on-site surveys and energy analysis of residential, commercial and industrial facilities.

He participated in the on-site data collection of commercial and industrial facilities that ADM conducted for the Southern California Edison (SCE) Retention Study. The surveys consisted of 1,000 commercial and industrial sites. The project involved extensive data collection on HVAC and process equipment, lighting systems, building characteristics and operational schedules. Additionally, he was responsible for verifying the operation of energy conservation measures which had been installed through SCE incentive programs.

He conducted on-site data collection surveys of commercial facilities for the Southern California Edison Saturation Study. The project involved extensive data collection at 900 commercial sites on HVAC equipment and systems, building characteristics, lighting systems, and operational schedules, as well as installed energy conservation features.

He collected on-site data for commercial facilities for Southern California Gas Company. The project involved extensive data collection and identification of energy efficient measures at over 500 commercial sites. The sites consisted of both incentive program participants and non-participants. In addition to the standard detailed data collection procedure, the surveyors identified features that were installed as part of the program as well as energy measures that were installed by non-participants.

Mr. Fouladi's work experience also includes:

- Engineering Consultant providing technical support including cost analysis, production control, facility design, energy management, and equipment start-up, performance and control for industrial facilities.
- Project Engineer responsible for HVAC system design, equipment, ducting and plumbing installation and system performance.

Mr. Fouladi received a B.S. in Mechanical Engineering from Howard University and a MS in Energy and Power from George Washington University.

Cyrus Davehlo

Mechanical Engineer

Cyrus Davehlo is a mechanical engineer at ADM Associates. As a field engineer and trainer, his primary responsibilities are to conduct energy surveys and analysis of residential, commercial and industrial facilities.

Mr. Davehlo has considerable experience in collecting information on energy use, energy conservation, and load management in residential, commercial and industrial facilities. He is skilled at interviewing building owners and at collecting data on industrial processes, HVAC equipment and systems, lighting systems, and building operational characteristics. He is also skilled at identifying cost-effective energy conservation measures. In addition to participating on the industrial customer survey and data base development for Wisconsin Electric, he is participating in the Commercial and Industrial End-Use Survey with Southern Company Services, Inc. in Atlanta.

Mr. Davehlo was involved with the Commercial and Industrial End-Use survey which ADM conducted for Florida Power & Light Company (FP&L). This survey gathered information on the characteristics of commercial and industrial buildings through on-site visits to 1,200 of FP&L's customers. Data collected documented the structural equipment characteristics of the buildings with a view to existing and potential energy conservation measures. The data collected are also being used to prepare input for COMMEND.

Mr. Davehlo's past experience includes several years as customer representative for major HVAC manufacturers, including Trane and York. He has also managed several HVAC installation projects.

Mr. Davehlo has a B.S. in Mechanical Engineering from Florida International University, with an emphasis on Industrial Technology.

Richard Burkhart
Technical Editor

Mr. Burkhart serves as ADM's Senior Technical Editor and desktop publisher.

His responsibilities include copy-editing, production and graphic design for reports and proposals, and designing and publishing marketing materials for the Duct Efficiency Training Program, Upstream High-Efficiency Gas Water Heater program and several other energy efficiency marketing programs.

He was also responsible for the production of a series of Commercial / Industrial site audit reports for *Entergy Services, Inc.* For *Kansas City Power and Light Co.* he developed automated templates using data linking functions between Microsoft Word and Excel to generate site reports, and was responsible for final copyediting and cleanup of the reports. He has also performed similar work for projects for *Southern California Edison Co.*

He is expert in the advanced techniques for a wide variety of software packages, including Microsoft Office 97 / 2000, Aldus Pagemaker 6.5, graphics arts packages such as Corel Draw 8 and Aldus Freehand, and in various World Wide Web page design software.

Prior to joining ADM, he worked as a freelance editing assistant, performing editing, graphic production and page layout for a series of operating manuals for computerized production equipment.

Mr. Burkhart earned his B.A. degree in Communications from California State University, Fullerton.

Where Does All The Money Go?

How much are you spending on utilities to run your motel? Lodging industry experts agree that after labor, the cost of energy is the second highest expense. For those of you who are owner-operators, energy may be your largest expense. Figure 1 shows the distribution of energy costs for running a typical motel in Los Angeles.

A comparison of your utility bills can provide a rough, first-cut estimate of energy efficiency levels at your facility. To calculate the cost per year, on a per room basis, add your electric and gas bills for the past year, and divide by the number of guest rooms at your facility. If your total annual energy cost per room is about \$300 or higher, you can benefit considerably from energy conservation

programs. Even if your total utility bills for the year are less than \$200 per room, there are still some specific programs that could provide benefits to you. There are several ways that the costs can be reduced. In fact, higher efficiency boilers, compact fluorescent lighting, low flow showerheads, and other energy saving equipment can save

thousands of dollars on avoided utility costs each year.

To learn how to reduce your utility costs, arrange for an on-site consultation by calling (800) 556-2127, or attend one of the training workshops. Look for workshop announcements in this newsletter, or in direct mail announcements sent out when a workshop is scheduled in your area.

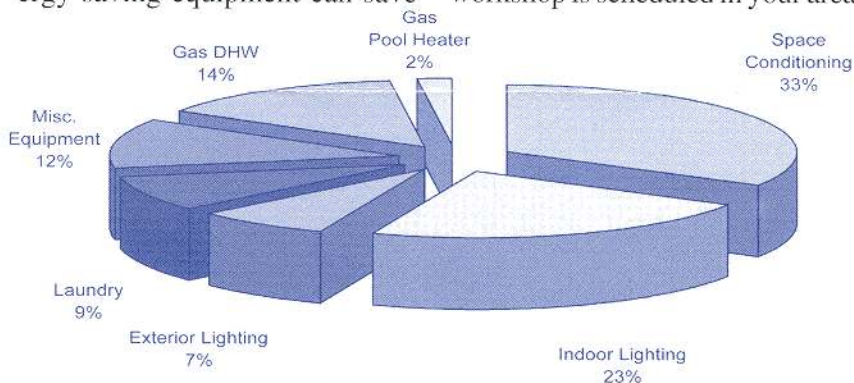


Figure 1 - Energy Cost Distribution - Typical Motel in Los Angeles
(source: On-Site Hotel/Motel Surveys)

Statewide Rebates Pay Big

High efficiency equipment improves the quality of your service while putting more money in your pocket. The Express Efficiency Program, a statewide rebate program which can help you improve energy efficiency at your facility, and increase your operating profits, is now available in California. This program is offered by Southern California Gas (The Gas Company), Southern California Edison (Edison), San Diego Gas and

Electric (SDG&E) and Pacific Gas and Electric Co. (PG&E). Rebates will be given for replacing older, inefficient equipment with new high efficiency equipment and lighting. This year, The Gas Company's and Edison's rebate programs include qualifying equipment in the following categories:

- Water heaters and boilers
- Reflective window film
- Setback thermostats

- Air conditioners and heat pumps
- Fluorescent fixtures and lamps used to replace incandescent bulbs
- Occupancy sensors, photocells and time clocks

As a customer of The Gas Company, you can take advantage of rebates for qualifying gas-fired equipment

(see "Rebates", page 4)



A  Sempra Energy company

Smart Lodging

Volume 2 2000

A Newsletter for our Lodging Industry Customers

Shine a new light on energy savings!

Seeing the Light

Lighting can be the greatest energy user in your motel. The typical motel in Los Angeles spends approximately 40% of its electric utility dollars on indoor and outdoor lighting. For motels that are further inland, lighting energy costs are typically second only to air conditioning. If you are using incandescent light bulbs at your facility, there is a great potential for reducing your electric utility bills and maintenance costs while providing high quality lighting for your guests.

Seeing the Difference

Fluorescent lighting saves up to 70% in energy costs when compared with incandescent bulbs. Figure 1 shows a comparison of average annual energy costs of in-

candescent bulbs vs. compact fluorescent lamps (CFL); comparable in light output (lumens) per watt of energy use.

Fluorescent lighting has advanced considerably in the past 10 years.

The quality has improved and prices have dropped. In fact, many of the problems previously associated with these high efficiency lamps, like flickering, slow start-up, harsh light quality, and outright failure, have been

See "Lighting" on page 3

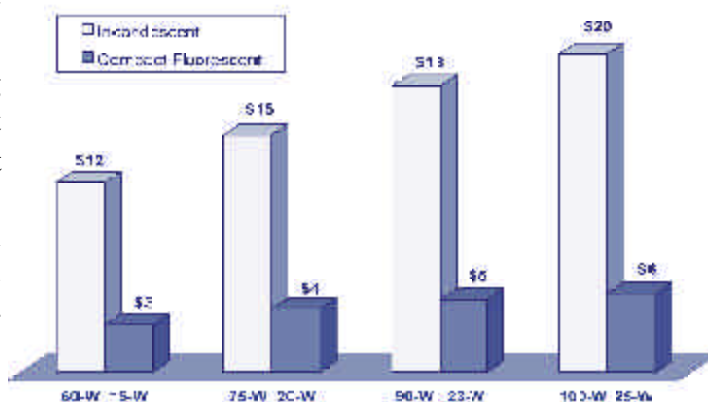


Figure 1. Annual Cost Comparison of Incandescent vs. Compact Fluorescent Lighting

Ozone in Your Laundry Room?

Ozone, when applied to laundry, is much different than the protective layer of ozone in the upper atmosphere. Sure, it's the same molecule, O_3 , but it is actually being created intentionally in hotel / motel laundry rooms across the country to help with the laundry load. Ozone injection systems are providing many benefits to motel operations with 100 or more rooms.

The Ozone molecule is a highly reactive form of oxygen, it is highly unstable by nature. This makes it a powerful oxidizing, cleansing and bleaching agent for all types of textiles. Ozone reacts very rapidly, dividing the organic molecules in the water and causing soils to break away from the fabric. Ozone also kills bacteria 3200 times faster than bleach. When

Ozone has completed its function, it reverts back to Oxygen (O_2), leaving no chemical residues.

Ozone works best in cold water, in fact, hot water breaks the ozone down before it can perform as intended. When an ozone injection system is integrated with your laun-

See "Ozone" on page 2

“Ozone” continued

dry system, you may be able to turn your boiler temperature down since hot water may only be needed for guestrooms.

Barry Brackbill, General Manager of a Days Inn in Orlando, Florida, had hot and cold water meters installed on the washing machines prior to introducing an ozone laundry system. After operating the ozone system for two months, he calculated 98% savings in hot water and 30% savings in water and sewer. Other benefits included a 25% faster wash cycle and 15% overall faster drying time. He says, “Hotel owners that are managing change to improve profitability with technology should not miss this opportunity.”

The Sheraton Four Points Hotel in Fort Walton Beach, Florida installed an ozone laundry system in July of

1998. General Manager Keith Meyers says, “We thought our biggest savings was going to be in gas consumption because we have turned our water heater to the laundry completely off. We have found though that our labor cost is where we are saving the most money.”

Some advantages to installing an ozone injection system include

- Reduced hot water use
- Reduced chemical additives required
- No Chemical residues
- Environmentally sound
- Reduced drying times
- Reduced wash and rinse cycle times
- Water and labor cost savings
- Extended linen life

Disadvantages include

- Ozone is highly toxic and hazardous requiring special handling
- Oil based stains, like make-

up, are more difficult to remove.

- High first cost
- May deteriorate materials such as rubber fittings, gaskets, and certain kinds of metals.

According to Jim Konides of Industrozone Technologies in Florida, ozone injection is not for everyone. These systems may not be cost effective for motels with less than 100 rooms.

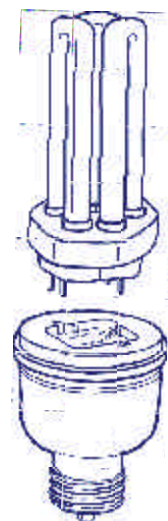
Ozone injection laundry systems are relatively new to the market place and are somewhat complex. It is not likely to function perfectly when it is first installed. It requires some adjusting to match your facility’s needs. It is important to find an ozone installation and service company with an adequate local support network to avoid leaving you hanging out to dry.

Did You Know?

- There are now water boilers with efficiencies up to 97%.
- Most new commercial washing machines have water extraction cycles that remove more water, reducing drying times and associated electricity, gas and labor costs.
- Low flow showerheads can save you as much on energy costs as replacing a 70% efficient water boiler with a new 95% efficient one.
- Weather stripping around exterior doors not only saves on energy costs, it significantly reduces outside noise from reaching inside of your guestrooms.
- Cleaning or changing the filters inside your space conditioners improves the indoor air quality of your guestrooms, while improving the efficiency and reliability of the unit.
- Each foot of non-insulated 1-1/2 inch hot water pipe has a potential loss of 421,000 Btu per year
- Hard water can leave mineral deposits, or scaling, on your boiler’s heat exchanger. One-quarter inch thickness of mineral scaling can reduce the efficiency by nearly 40%.
- Solar reflective window films block Ultra Violet (UV) light, protecting draperies, carpets, furniture and linens from premature deterioration.

“Lighting” continued

eliminated for most CFLs. Price reductions, in combination with this year’s Express Efficiency rebates and other possible financing, make it possible for you to begin replac-



ing incandescent light bulbs with CFLs at little or no initial investment.

Seeing the Money

Consider the replacement of a single 75-watt incandescent bulb with a two-piece 20-watt CFL (separate lamp and ballast; see Figures 2

Figure 2. & 3). Table 1 shows the cost, payback period and lifetime savings when a single CFL is installed. The longer lamp life associated with CFLs, up to 10 times that of incandescent bulbs, also reduces the labor associated with finding and replacing burned out bulbs.

Rebates are available for a variety of fluorescent lights through the Express Efficiency rebate program. To take full advantage of available funds, it is important to know all of your options. We can help you identify what will work best at your facility. For more information on fluorescent lighting and available rebates, take advantage of our free energy consultation as described on page 4.

Keeping Your Investment

If the issue of theft is a concern for you, you can install simple, inexpensive anti-theft locking devices. The device secures the CFL in the fixture for a price of about \$1.00 each.

Another simple device available is the *permanent installation disk*. This device, about the size of a quarter, is inserted into the light socket, and permanently modifies the lamp, allowing only CFL installation. This type of modification receives the maximum available utility rebate per CFL purchased.

Check Out This Years Rebates

The Express Efficiency Rebate Program, a statewide program which can help you reduce your energy costs and improve your bottom line, is now available through both The Gas Company and Southern California Edison for small businesses.

To be eligible for the Express Efficiency program, your business must have an electric or gas account with a participating utility company. Your business is eligible even if you purchase energy from another provider, as long as you receive distribution services from The Gas Company or Southern California Edison Company.

For more information or to get help processing your application call: (800) GAS-2000 for natural gas fired equipment, or (800) 736-4777 for electric use equipment.

Price of Each 20 Watt CFL	\$13.50
Maximum Available Rebate	- \$8.25
Net Cost	\$5.25
Pays For Itself	In 7 months
Lifetime Savings	\$83

Table 1. Average Cost and Payback of Fluorescent Lamps

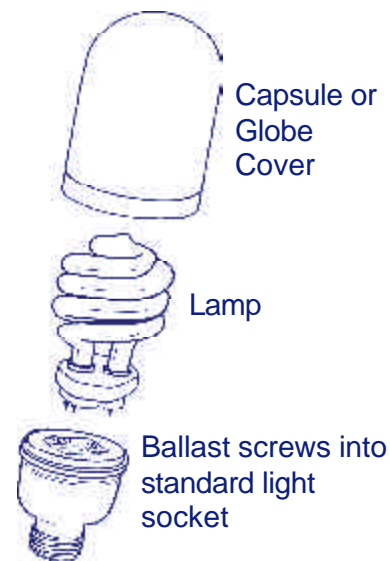


Figure 3.

Free On-Site Energy Consultation

As part of The Gas Company's Smart Lodging Education Program, free one-on-one, on-site energy consultations are extended to small, independent hotel and motel owners. The consultation will provide you an understanding of where your major energy dollars are being spent, where potential energy waste is, and provide step by step solutions to make your energy uses more efficient.

We can assist you in evaluating water heating systems, space heating and air conditioning equipment, showerheads, indoor and outdoor lighting, and other energy using equipment to determine whether upgrading to more efficient equipment is cost effective. We will guide you through the process of:

- Locating areas of energy waste
- Identifying energy efficiency improvement options
- Estimating potential savings and payback periods
- Applying for utility rebates, and
- Soliciting outside financing, if necessary.

For more information or to schedule an appointment, please call ADM Associates, Inc., our contractor, at **1-800-556-2123**.



A  Sempra Energy company

Smart Lodging

Volume 3 2000

A Newsletter for our Lodging Industry Customers

Energy Savings Big Deal for Motels

The Gas Company has been offering free on-site energy consultations to independently owned and operated motels. As part of our Smart Lodging education program, these free consultations are beginning to pay off. In this Newsletter we describe the results two motels obtained by upgrading their facilities and replacing old, inefficient equipment with energy efficient ones. Both motels took advantage of free consultations and utility rebates to

improve overall efficiency of their facilities and lower utility costs, while continue to provide a safe, comfortable environment for their guests.

The Travelodge in Hemet is a 50-room motel, owned by Heath Patel and operated by Ash Patel. The maintenance engineer, Harold Milinkovich, read the Smart Lodging Newsletter #2 in July and called to request a free energy consulta-

tion. Prior to our on-site visit, Mr. Milinkovich mentioned that the owner had been unhappy with the high utility bills and would like to do something about it. He also indicated that the owner is always interested in affordable ways to reduce operating costs as long as it does not interfere with the comfort and safety of guests.

Cont. on page 2

Quickest Return on Investment

After surveying the equipment at over 400 motels, one energy saving device - water saving showerheads - soars above all the rest as the best investment with the overall shortest payback period, which is usually less than 6 months. This relatively inexpensive device can significantly reduce gas use as well as water and sewer costs, saving motel owners a lot of money in a short amount of time.

We discovered, through our on-site consultations, that most motel owners do not know how much water their showerheads dispense. Half of the guestrooms surveyed had showerheads using more than 2.5 gallon per minute (gpm), and about

a third of those were measured to be 4 gpm or more.

How much difference in your operating costs can water saving showerheads really make?

Consider a 50-room motel with a 50% occupancy rate and 3.5 gallon per minute showerheads. Replacing each showerhead with a 2.5 gallon per minute model saves about \$500 per year in gas use and about three times that in water & sewer savings. Replacing them with 1.75 gallon per minute showerheads saves about \$900 per year in gas use. High quality water saving showerheads can be

purchased from local plumbing supply wholesalers at prices ranging from \$5 to \$20 each. Combining gas, water and sewer savings together, even the most expensive water saving showerheads pay back in less than 6 months, sometimes in less than 2 months.

If you already have water saving showerheads but are dissatisfied with their performance or would like to upgrade to a better quality model, contact your local plumbing supply wholesaler.

Additional information on energy saving equipment is available from our contractor, ADM Associates, Inc. upon request. Call 1-800-556-2123 for more information.

SECTION 1 INTRODUCTION

This manual has been developed by the Southern California Gas Company (The Gas Company) as a part of its educational program, to provide independent lodging owners and operators with information they can use to make informed energy-using equipment purchases and to put practices and procedures in place that can result in substantial energy and cost savings.

This package of information has been developed specifically for hotels and motels with less than 250 rooms, which are generally operated and managed by individual owners. It provides assistance in selecting equipment for the following categories:

- Energy efficient water heating
- Low-flow showerheads
- Energy efficient space conditioning
- Room energy management systems
- Solar reflective window film
- Energy efficient lighting
- Energy efficient clothes washers
- Energy efficient cooking and refrigeration

In the following sections, information is provided to help you understand, manage, and get help, when needed, to reduce your utility costs while providing a comfortable and secure environment for your guests.

- Section 2 provides general information on utility costs, by category of use (such as water heating, lighting, air conditioning, etc.)
- Section 3 provides information on what you can do to reduce utility costs by improving the efficiency of equipment at your facility. It provides information on equipment options, equipment performance and payback periods.

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- Section 4 provides information on how you can obtain financial assistance through utility rebates and financing. This section also provides the necessary forms for applying for rebates and financial assistance. A telephone number you can call to get additional help for processing your applications is also listed.
 - Section 5 provides additional information on energy efficiency in hotels and motels.

For additional information regarding the Lodging Industry Education Program, please call (800) 556-2123.